Sint autem A B & C D in diverſis Planis, ita tamen ut E G producta, ſit ad rectos *angulos vtrique A B & C D: accedant denique ad ſe invicem Corpora, prout opus fuerit, ſervata tamen eadem inclinatione & ſitu Axium.*

Dico, ex revolutione & mutua attritione Corporum prius poſitorum exurgere noua corpora Geometrica, quorum P & Q erunt Cylindroidea Hyperbolica *æqualia, R. vero* Conoides Hyperbolicum, *ſpecie & magnitudine datum.*

Demonſtrationem in promptu habemus, nec non Modulum ipſius Machinæ, terendis Lentibus Hyperbolicis deſtinatæ; quam operoſa pictura & prolixa explicatione deſcribere, mihi & artifici magis fuerit moleſtum, quam Dædalo *cuivis ſagaci ſimilem ad-invenire. Poſtquam enim expoſita jam ſunt principia Geometrica, facile erit conjicere, quale ſit Inſtrumentum; nempe, tres ſunt Tabulæ oblongæ, planæ, validæ, labiles, & ſibi invicem impoſitæ: Infima & Media ſuſtinent* inæqualia *Capitula (ſive Anſas mamphur ſuſtinentes) alternatim poſita; id poſtulat utriuſque mamphuris obliquitas & quaſi decuſſatio: Summæ Tabulæ* æqualia *ſunt Capitula in longum Tabulæ diſpoſita; & perforato citimo Capitulo mamphur tranſmittitur. Omitto rotas, rotulas, lora, pondera, cochleas, & reliqua ad motum expeditum & Machinæ firmitudinem neceſſaria. P pertinet ad infimam Tabulam; Q ad mediam; R, ad ſummam. R, Lens eſt vitrea: Q, Modulus Lentem terens; P, Formula Modulum corrigens; quæ, dum motu obliquo, & diverſo a motu tam Lentis quam Moduli, fertur, delet continuo & deterit, quicquid vitii imprimitur in Modulum ex Lentis & Materiæ attritione.*

Quare, cum adeo ſimplex & ſpontanea ſit iſta Hyperbolici Conoidis *genitura, ex ſolis nempe motibus Circularibus; cumque motus ſit duplex & varius, credibile eſt, Lentes* Hyperbolicas *ex hiſce Principiis vel nullis fore explicandas.*

Some Inquiries Concerning the Salt-Springs *and the Way of* Salt-making *at Nantwich in Cheſhire; Anſwer'd by the Learned and Obſerving* William Jackſon *Dr. of Phyſick.*

1. *What is the depth of the Salt-ſprings?* The depths are various, in ſome places not above 3. or 4. yards. In our Town of *Nantwich*, the Pitt is full 7. yards from the

the footing about the Pitt; which is gueſsed to be the natural height of the Ground, though the Bank be 6. foot higher, accidentally raiſed by rubbiſh of long making Salt, or *Walling*, as they call it, In other places the Springs lye much ſhallower; for in two places within our Townſhip the Springs break up ſo in the Meadows, as to frett away not only the graſs, but part of the earth, which lyes like a breach,at leaſt halfe a foot or more lower than the turfe of the Meadow, and hath a Salt liquor, ouſing, as it were,out of the mudd, but very gently.

2. *What kind of Country 'tis thereabout, where the Springs are, whither Hilly &c.; And what Plants grow near them?* Our Country is generally a low ground, witneſs the name given to it (*the Vale Royal of England*;) yet 'tis very full of Collicular Eminencies, and various Riſings,to diſtinguiſh it from being all Meadow. We have alſo a peculiar ſort of ground in this County and ſome adjacent parts, which we call *Moſſes*; and they are a kind of Mooriſh boggy ground, very ſtringy, and fatt: which ſerveth us very well for Turfs,cutt out like great Bricks and dried in the Sun. And this kind of ground is ſo much here, that there are few Townſhips but they have their particular Moſſes. In theſe is found much of that Wood we call *Firr-wood*, which ſerves the Country-people for Candles, Fewel, and ſometimes for ſmall Timber-vſes; and this the Vulgar concludes to have layn there ſince the Flood. But generally theſe Moſſes ſeem to be places undermined by ſome Subterraneous ſtreams; or by the diſſolution of ſome matter, that made them equal with the reſt of the ground formerly: In which conjecture I am confirmed by this, That near a place of My Lord *Cholmondeley's*, called *Bilkcly*, about 9. or 10. years ſince, not far from one of theſe Moſſes, without any Earth-quake, fell in, a piece of ground about 30. yards over, with an huge noiſe, and great Oakes growing on it fell with it together; which hung firſt with part of their heads out, afterwards ſuddenly ſunck down into the grounds, ſo as to become inviſible: Out of which Pitt they drew Brine with a pitcher tyed to a cart-rope, but could then find no bottom with the ropes they had there: Since, the Pitt is filled up with water, and now doth not taſte Salt, but a very little brackiſh, a very ſmall rindlet paſſing through it. The

neareſt Salt-ſprings to this place are at *Dartwich* about 3. miles from it, belonging to the preſent Lord *Keeper*, and My Lord *Cholmondeley*.

Some *Hills* we have, but no bigg ones, near our Springs; which generally lye all along the River *Weeuer*, as *Hankillow*, *Hatherton*, *Oſterſon*, *Bartherton*, *Nantwich*, *Weever*, *Leftwich*, *Northwich*; yet there is an appearance of the ſame Veine at *Midlewich* nearer the River *Dane*, than *Weever*; which notwithſtanding ſeems not to be out of the Line of the *Weveriſh* ſtreame; and theſe lye all near Brooks, and in Medowiſh grounds.

As to *Plants*, I could obſerve no ſingularity at all; for, where the Salt reaches the ſurface, it frets away all (as I ſaid before,) and upon the Turfe near the old decayed Pitts grows the very ſame, that doth in the remoteſt place of the Meadow; only I obſerve, that, where the Turff was fretted away, *Ruſhes* maintain'd their ſtation longeſt; yet they grow alſo in other moiſt grounds, ſo that they are no friends to the Salt-ſprings, but I perceive, they reſiſt them beſt.

3. *Whether there be any Hot-ſprings near the Salt-ones? And Whether the Water of the Salt-ſprings be hotter or cooler, than other Spring-water?* The Water of the Salt-ſprings here is very cold at the bottom of the Pitt, inſomuch that when the Briners ſometimes goe about to cleanſe the Pitt, they cannot abide in, above half an hour, and in that time they drink much Strong water.

There is not any Hot Springs (that I can hear of) nearer us, than *Buckſton*-well, which is about 30. miles diſtant near *Darby-Peak* Hills.

4. *Whether they find any Shells about thoſe Springs, and what kind of Earth it is?* I cannot hear of any Shells digged up, though of late ſeveral new Brine-ſprings have been both ſought, and found by ſinking deep Pitts; yet none knows of any Shels, but rather a blackiſh Slutch mixt with the Sand, which infects the whole Spring (like the Scuttle-fiſh) black, when 'tis ſtirr'd; elſe the water runs very clear.

5. *How ſtrong the Water is of Salt?* Springs are rich or poore in a double ſence; for a Spring may be rich in Salt, but poor in the quantity

quantity of Brine it affords. Thus they have a rich Brine in their chief Pit at *Midle-wich*, which yields a full *fourth* part of Salt, like the rich *Burgundian* Springs, mentioned in *Kircher's Mundus Subterraneus*; yet this is ſo thrifty of its Brine, that the Inhabitants are limited to their proportions out of it, and their quantity is ſupply'd out of Pitts that afford a weaker Brine. Our Pitt at *Nantwich* yields but a *ſixth* part; but then 'tis ſo plentiful a Spring, that, whereas they ſeldome *Wall*, that is, make Salt, in above *6.* Houſes at a time, and there are or ſhould be about 50. Wich-houſes in the Town; this Pitt is Judged ſufficient to ſupply them all: And this advantage would accrew over and above, that ſuch quick Uſe of the Pitt extreamly ſtrengthens the Brine, perhaps to a degree little leſs than that of *Middle-wich* Pitt: For, I have tryed it myſelf, that a quart of Brine, when the Pitt hath been drawn off 3. or 4. days firſt, to ſupply 5. or *6.* Wich-houſes, hath yielded an Ounce and an halfe more of Salt, than at another time, when it hath had a reſt of a week or thereabout. But I conclude, that the neareſt conjecture, to be made of the ſtrength of this Brine, is, to yield *one* pound of Salt for *ſix* pounds of Brine; as I have ſeverall times tryed without any operation that might obſcure the working: By which proportion you ſee, that *ſix* Tuns of Brine yield *one* tun of Salt: which may be built upon; though in their ordinary way of working they make ſuch variety of Additions, that 'tis impoſſible for any to be confident of the Product.

To adde ſome particulars, concerning this point; I ſhall tell you, that *March* 8. 1668. I weighed *two* pounds of diſtilled water in a narrow-mouthed Glaſs-bottle, that I might make an exact marke for a quart. This Bottle, being fill'd with our Brine to the very ſame mark, weigh'd (beſides the tare of the Bottle) *two* pounds *three* ounces and *five* drachmes. This was taken up, when the Wich-houſes but began to work, ſo that the Pitt was but little drawn. I fill'd up the Bottle with the ſame Brine, and it weighed juſt three drachms more. This Brine, boyled away without any addition or clarification, made *five* ounces and *two* drachmes of Salt. Five days after, when the Pitt had been drawn all that while for the working of the Wich-houſes, vid. *March.* 13, the ſame Bottle, fill'd to the Quart-mark afore-

aforeſaid with Brine *then* taken up, weighed, beſide the Bottle, *two* pound *four* ounces and one drachme: the ſame time the Bottle, filled as in the former Experiment, weighed juſt *two* pounds and an *halfe*, which is three drachms more than the quart mark before; which boyl'd into Salt made *ſix* ounces *ſix* drachms and *two* ſcruples: which exceeds the former quantity of Salt, *one* ounce *four* drachms and *two* ſcruples, though the Brine exceeded the former in weight but *four* drachms.

By which Tryall I confuted alſo a Tradition, which the Briners have amongſt them, *viz.* That the Brine is ſtrongeſt at times of the Spring-Tydes, to wit, at the Full and Change of the Moon. For *March* 8th. aforeſaid was only one day paſt the Full, and then the Brine was weaker than it was the 13th day, when 'twas 6. days paſt the Full. So that I conclude, there could be no other reaſon, than that the much drawing makes way for the Salt-ſprings to come the quicker, and allows the leſs time for the admisſion of Freſh Springs.

6. *What is the Manner of their Work? or What Time of boyling the Salt-water? Whether they uſe any peculiar thing to make it granulate, and if ſo, What that is?* Their manner of working is this: They have formerly boyl'd their Brine in 6. Leaden pans with wood-fire; upon which accompt they all claime their intereſt in the Pitt by the name of ſo many *Six Leads Walling*; by which they each know their proportion; but in the memory of many alive they changed their 6. Leads into 4 Iron-pans, ſomething better than a yard ſquare, and about 6. inches deep, ſtill fitting the Content of theſe to that of the 6. Leads: and of late many have changed the 4 Iron-pans into two greater; and ſome *Wall* but in one: But ſtill the Rulers gage it to their Old proportions. Thus much ſeem'd neceſſary for underſtanding the ſeveral Operations.

They uſe for their Fewell, Pit-coals, brought out of *Stafford-ſhire*. Theſe Panns are ſet upon Iron-barrs, and made in, on all ſides, very cloſe (that the flame nor ſmoak break through) with clay and bricks. They firſt fill their Pans with Brine out of the Pitt; which coms to them in ſeveral Woodden Gutters: then they put into their Panns amongſt their Brine a certain mixture, made of about 20. Gallons of Brine, and 2. quarts of Calves Cows and chiefly Sheeps bloud, mixt into a Clarret-Colour: Of

this

this mixture they put about 2. quarts into a Pann that holds about 360. quarts of Brine; this bloudy brine, at the firſt boyling of the Pann, brings up a ſcumm, which they are careful to take off with a Skimmer, made with a woodden handle thruſt through a long ſquare of Wainſcot-board, twice as bigg as a good ſquare trencher: this they call a *Loot*. Here they continue their fire as quick as they can, till halfe the Brine be waſted, and this they call *Boyling upon the freſh*. But when 'tis halfe boyled away, they fill their Panns again with new Brine out of the *Ship*, (ſo they call a great Ciſtern by their Panns ſides, into which their Brine runs through the Woodden Gutters from the Pump, that ſtands in the Pitt;) then they put into the Pann, 2. quarts of the Mixture following: They take a quart of Whites of Eggs, beat them throughly with as much Brine, till they are well broken; then mix them with 20. Gallons of brine, as before was done with the Bloud; and thus that which they call the *Whites* is made. As ſoon as this is in, they boyle ſharply, till the ſecond Scum ariſe; then they ſcum it off as before, and boyle very gently till it Corne; to procure which, when part of the Brine is waſted, they put into each Pann of the Content aforeſaid about a quarter of a pint of the beſt and ſtrongeſt Ale they can gett: this makes a momentany Ebullition, which is ſoon over, and then they abate their fires, yet not ſo but that they keep it boyling all over, though gently; for the Workmen ſay, that if they boyle faſt here, (which they call *Boyling on the Leach*, becauſe they uſually all this time lade in their Leach-brine, which is ſuch Brine, as runs from their ſalt, when 'tis taken up before it hardens) if I ſay, they boyle faſt here, it waſts their Salt. After all their Leach-Brine is in, they boyle gently, till a kind of Scum come on it like a thin Jce; which is the firſt appearance of the Salt: then that ſinks, and the Brine every where gathers into Cornes at the bottom to it, which they gently rake together with their *Loots*: I ſay, *gently*; for much ſtirring breakes the Corne. So they continue, till there is but very little brine left in the Pann; then with their *Loots* they take it up the Brine dropping from it and throw it into their *Barrows*, which are Caſes made with flat cleft wickers, in the ſhape almoſt of a Sugar-loaf, the bottom upper-moſt. When the Barrow is full, they let it ſtand ſo for an hour and an halfe in the Trough,

where

where it drains out all the Leach-brine aboveſaid, then they remove it into their Hot-houſe behind their Works; made there by two Tunnels under their Panns, carried back for that purpoſe. The Leach-brine, that runs from the Barrows, they put into the next Boyling, for 'tis to their advantage, being ſalt melted, and wanting only hardning.

This work is perform'd in 2. hours in the ſmaller panns, which are ſhallower, and generally boyle their brine more away; wherefore their Salt will laſt better, though it does not granulate ſo well, becauſe, when the Brine is waſted, the fire and ſtirring breaks the Cornes. But this Salt weighs heavier, and melts not ſo ſoon; and therefore is bought by them, that carry it farr. But in the greater Panns, which are uſually deeper, they are above halfe an hour longer in boyling; but, becauſe they take their Salt out of their Brine, and only harden it in their Hot-houſe, 'tis apter to melt away in a moiſt Air: Yet of this ſort of Salt the bigger the grain is, the longer it endures; and generally this is the better granulated and the clearer, though the other be the whiter. Vpon which I rather think, 'tis the taking of the ſalt out of the Brine before it be waſted, that cauſes the granulating of it, than the Ale to which the Workmen impute it. This kind meaſures profitably well; therefore much bought by them that buy to ſell again.

They never cover their Panns at all, during the whole time of Boyling. They have their Houſes like Barns open up to the thatch with a Cover-hole or two, to vent the ſteam of the panns. Poſſibly Tiles may do better, but no body is yet ſo curious as to try, but the ſteam is ſuch, that I am confident, no plaiſter will ſtick, and boards will warp, and their nailes will ruſt ſo, as quickly to fret in pieces.

7. *Whether the Salt, made of theſe Springs be more or leſs apt to diſſolve in the Air, then other Salt? And whether it be as good to powder Beef or other Fleſh with, as French Salt?* This Queſtion I cannot well anſwer, in regard that *French* Salt coms not to us, to compare the efficacy of the one with the other experimentally; but this I can aſſure for our Salt, that with it both Beef and Bacon is very well preſerv'd ſweet and good a whole year together; and I do apprehend this Salt to be rather more ſearching than *French*

Salt,becauſe I have often obſerved, that meat kept with this Salt ſhall be more fiery Salt to the midſt of it, than I have obſerved, when I have eaten powder'd meat on Ship-board, which was probably done with *French* Salt, I then being on the South-ſide of England, and in a Dutch Veſſel. 'Tis certain, *Cheſhire* ſends yearly much Bacon to *London*, which never yet had any mark of infamy ſet upon it; and hanged Beef(which others call *Martin*-maſs-Beef) is as good and as frequent in *Cheſhire*, as in any place; ſo that I conclude, that this Salt is fully effectual for any Uſe, and as good as any other; and therefore hope, 'twill be proſecuted in the uſe, that ſo the Trade of our own Commodities may rather be advanced, than of forraign, eſpecially this of Salt; which if it ſhall pleaſe the *R. Society* to promote, they will lay an obligation on all our Country never to be forgotten.

Mean time,if I have related here any thing obſcurely or imperfectly, I am ready to anſwer any new Queries, that ſhall ariſe out of this obſcurity, or give larger ſatisfaction to any of the Old, that ſhall be thought hereby not ſufficiently explained.

Explication of the Figures belonging to the Accompt of Salt-making.

Fig. 1.

This is the Model of an Iron-pann of that proportion, when Four *are uſed in one houſe.*

a a. *The Eares to hang the Pann by upon the Brick work.*

b. *The ſeveral Junctures of the Iron plates riveted.*

C C. *The breadth and length of the Pann near 4. foot.*

C d. *The depth of the ſides of the Pann, about 6. inches.*

Fig. 2.

a a. *The Hot-houſe between the Wall and the Chimney.*

b b. *The two Tunnels.*

CC. *The Chimney-back, into which the two Tunnels conveigh the ſmoake.*

d d d. d. *The four Panns.*

E. *The partition-wall between the Panns and the Hot-houſe.*

f. *The Fire-places.*

g g. *The Aſh-holes.*

h. *The Hearth below.*

i i. *The deſcent to the Hearth.*

Fig. 3.

The Back with his ſtale, with which they reach brine out of their Ship to fill their Panns withall.

Fig. 4.

a. b. *Several poſitions of their* Loots, *with which they skim,and gather their Salt.*

Fig. 5.

a.a. *Two* Barrows *newly filled with Salt; ſet into the Leach-trough to dripp out the Leach or Leack-brine,*

b b, *The Salt heaped above the Barrows and patted down hard.*

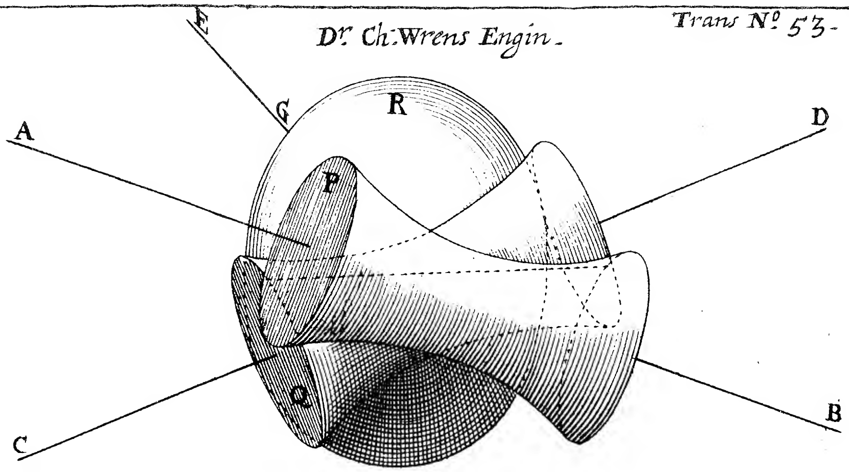
C. *The Leach trough.*

Fig. 6.

A gutter, which they lay over from one Pann to another, to poure the Brine into the fartheſt panns.

Trans Nº 53-

Dr. Ch: Wrens Engin.



For y^e Salt-work

Fig. I.

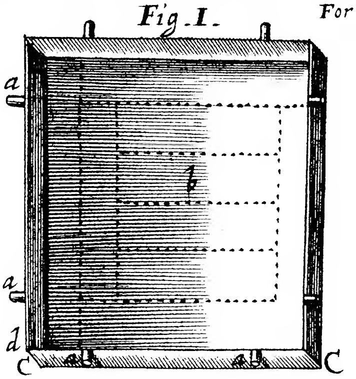
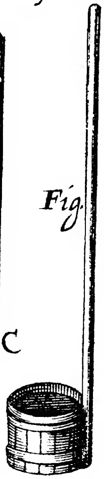


Fig. III.



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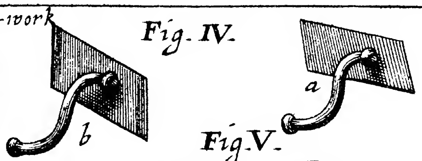

Fig. V.

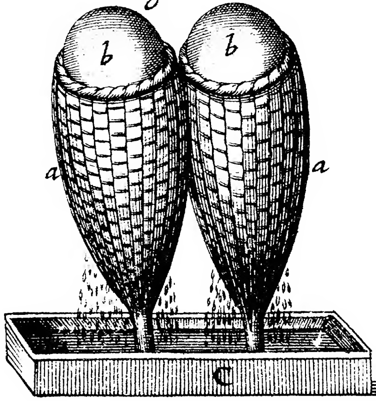

Fig. VI.

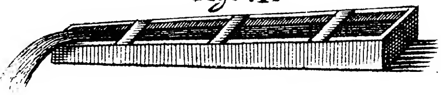

Fig. II.